<u>REMARKS</u>

Reconsideration of the pending application is respectfully requested on the basis of the following particulars:

1.   <u>Amendments and Support for Same</u>

By the Response, independent claims 1, 10, 21, 30, and 39 have been amended to specify that the image analysis of the DXA image is performed using an Active Shape Model to more particularly point out and distinctly claim the subject matter of the invention. Dependent claims 5, 16, 25, 34, and 40 have been cancelled, and dependent claims 6, 17, 26, 35, and 41 have been amended to change their dependency. Accordingly, claims 1-4, 6-15, 17-24, 26-33, 35-39, and 41-44 are respectfully submitted for consideration, of which claims 1, 10, 21, 30, and 39 are independent.

2.   <u>Rejections under 35 U.S.C. §103(a)</u>

With respect to the rejection of claims 1-44 under 35 U.S.C. §103(a) as being unpatentable over Mazess (WO 94/06351), in view of Lang (US 2005/0010106), Applicant respectfully traverses the rejection at least for the reason that Mazess and Lang, combined or separately, fail to teach, disclose, or suggest all of the limitation recited in the rejected claims.

Independent claims 1, 10, 21, 30, and 39 generally direct to an apparatus comprising a DXA scanner configured to scan a body area of a patient to thereby produce a DXA image of a body part within said body area, <u>and an image analysis module configured to perform shape analysis of the DXA image using an Active Shape Model (ASM) and to perform texture analysis of the DXA image</u>, to thereby generate an image data set representative of aspects of the shape of the body part and the structure of the bone.

In contrast, Mazess generally describes a method of automatically determining certain morphological measurements from a scan of a body part, including a densitometry scan. However, Mazess fails to teach, disclose or suggest an image analysis module configured to

perform shape analysis of the DXA image using an ASM, and to perform texture analysis of the DXA image, as recited in Applicant's claims.

As background information, shape analysis using an ASM concerns the application of a computer implemented statistical model to an image of an object, which iteratively deforms in accordance with pre-established rules to fit the appearance of the object in the image, until an optimum fit is found. Texture analysis concerns the analysis of small scale variations in image intensity, within a larger region of interest, which can yield information about the material properties of the object in the image. Both techniques are dependent on subtle variations in shape and texture of the image, and it is well known that such techniques will only produce meaningful results when applied to images of sufficiently high resolution and quality.

At the priority date of the present invention, DXA was primarily known as a way of measuring Bone Mineral Density (BMD) rather than as an imaging technique. While the data obtained from a DXA scan could be assembled into an image, from which approximate morphological information could be obtained, it was widely recognised that such images were of limited use due to their poor quality and low resolution. Accordingly, at the priority date of the present invention, a skilled person would not have considered applying shape analysis using an ASM, or texture analysis, to images assembled from DXA scan data.

As noted above, Mazess discloses a method for automatically deriving basic morphological measurements from scan data. However, these processes do not involve the application of shape analysis using an ASM or of texture analysis to an image assembled from such scan data. Rather, the processes disclosed in Mazess involve mathematically processing the data to obtain average values for basic morphological parameters such as bone height and width, which could also be obtained through manual measurement of an image assembled from the scan data.

By obtaining average values, the processes disclosed in Mazess can accommodate low resolution scan data, which allows morphological information to be derived from densitometry data. In contrast, shape analysis using an ASM requires shape details to be sharply defined in the image under analysis. Moreover, texture analysis requires a high resolution image in order to yield meaningful information about bone structure. Accordingly, it would not be obvious to the skilled person that the automated processes disclosed in

Mazess could be replaced by image analysis using an ASM, or by texture analysis of a DXA image.

With respect to the Examiner's reliance on Lang to cure the deficiencies of Mazess, Applicant respectfully asserts that Lang does not disclose the use of DXA as an imaging technique, despite describing an extensive list of available imaging techniques, and despite acknowledging DXA as a method of measuring BMD. Thus, while Lang discloses deriving information about "bone microarchitecture" and "bone macro-anatomy" from analysis of images obtained by conventional imaging methods such as, x-ray, MRI and CAT scans, there is nothing in this document to suggest that the disclosed techniques could be successfully applied to an image assembled from DXA scan data. Neither is there anything in this document to suggest that an ASM could be successfully applied to an image assembled from DXA scan data.

It is considered that, in the absence of any indication that shape analysis using an ASM, or texture analysis, could usefully be applied to an image assembled from DXA scan data, the skilled person would simply not consider combining the disclosures of Mazess and Lang.

To reinforce this point, it is noted that Lang is specifically concerned with accurate BMD and bone structure data (see page 2 paragraph 12 of Lang) and specifically rejects DXA techniques as having only limited accuracy (see page 1 paragraph 5 of Lang) due to the variable composition of soft tissue. It is thus considered that Lang specifically teaches away from the use of DXA techniques for determining information about bone structure. Applicant respectfully reminds the Examiner that, according to MPEP §2145 (X)(D)(2), references cannot be combined where a reference teaches away from their combination.

In view of the amendment and arguments set forth above, Applicant respectfully requests reconsideration and withdrawal of the §103(a) rejection of claims 1-44.

3.   Conclusion

In view of the amendments to the claims, and in further view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is requested that claims 1-4, 6-15, 17-24, 26-33, 35-39, and 41-44 be allowed and the application be passed to issue.

If any issues remain that may be resolved by a telephone or facsimile communication with the Applicant's representative, the Examiner is invited to contact the undersigned at the numbers shown.

Further, while no fees are believed to be due, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-4525.

Respectfully submitted,

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